



### **Key Data Covestro Group**

	2017	2018	Change
	in Mio. €	in Mio.€	in %
Core volume growth <sup>1,2</sup>	+3.4%	+1.6%	
Sales	14,138	14,616	+3.4
Change in sales			
Volume	+4.3%	+2.3%	
Price	+16.1%	+4.5%	
Currency	-1.6%	-3.0%	
Portfolio	0.0%	-0.4%	
Sales by region			
EMLA <sup>3</sup>	5,997	6,284	+4.8
NAFTA⁴	3,398	3,469	+2.1
APAC <sup>5</sup>	4,743	4,863	+2.5
EBITDA <sup>6,7</sup>	3,435	3,200	-6.8
Changes in EBITDA			
of which volume	+11.5%	+6.3%	
of which price	+95.4%	+18.7%	
of which raw material costs	-33.6%	-16.8%	
of which currency	-3.0%	-2.9%	
EBIT <sup>8,9</sup>	2,808	2,580	-8.1
Financial result	(150)	(104)	-30.7
Net income <sup>10</sup>	2,009	1,823	-9.3
Operating cash flows <sup>11</sup>	2,361	2,376	+0.6
Cash outflows for additions to property, plant, equipment and intangible assets	518	707	+36.5
Free operating cash flow <sup>12</sup>	1,843	1,669	-9.4
Net financial debt <sup>13, 14</sup>	283	348	+23.0
ROCE <sup>15</sup>	+33.4%	+29.5%	
Employees (in FTE) <sup>14, 16</sup>	16,176	16,770	+3.7

Core volume growth refers to the core products in the Polyurethanes, Polycarbonates and Coatings, Adhesives, Specialties segments. It is calculated as the percentage change in externally sold volumes in thousand tons compared with the prior year. Covestro also takes advantage of business opportunities outside its core business, for example the sale of precursors and by-products such as hydrochloric acid, sodium hydroxide solution and styrene. These transactions are not included in core volume growth. Reference values calculated based on the definition of the core business effective March 31, 2018

EMLA: Europe, Middle East, Africa and Latin America (excl. Mexico) region

NAFTA: United States, Canada and Mexico region

APAC: Asia and Pacific region

EBITDA: EBIT plus depreciation and amortization

Adjusted EBITDA is not reported because no income or expense items were recognized as special items either in the reporting period or in the corresponding

prior-year period.

EBIT: income after income taxes plus financial result and income taxes

<sup>9</sup> Adjusted EBIT is not reported because no income or expense items were recognized as special items either in the reporting period or in the corresponding prior-year period.

<sup>10</sup> Net income: income after income taxes attributable to the stockholders of Covestro AG

<sup>11</sup> Operating cash flows: cash flows from operating activities according to IAS 7

<sup>12</sup> Free operating cash flow: operating cash flows less cash outflows for additions to property, plant, equipment and intangible assets

<sup>13</sup> Excluding obligations for pensions and other post-employment benefits
 <sup>14</sup> As of December 31, 2018 compared with December 31, 2017

<sup>15</sup> ROCE: The return on capital employed is calculated as the ratio of adjusted operating result after taxes to capital employed. The capital employed is the

capital used by the company. It is the sum of noncurrent and current assets less noninterest-bearing liabilities such as trade accounts payable.

<sup>16</sup> Employees calculated as full-time equivalents (FTE)

A sustainable world. A pleasant, simple life for as many people as possible.

This does not need to be a utopia, but we can only reach this goal together. Working together, supporting others and inspiring others – this is the Covestro path.

The path to our vision:

To make the world a brighter place.

FΑ

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At Covestro, 2018 was a year of product launches, research breakthroughs and economic successes; of numerous challenges, special highlights and routine tasks; of individual commitment and collective effort. Below, the Board of Management discusses the last year, its expectations for 2019 and what makes the company so special.

Markus Steilemann: Dear Readers, Covestro can look back on another successful year - not least because we're on hand to help with our products and solutions wherever there are urgent challenges to be faced in the world. Nowhere is this more evident than in the case of climate change: Record CO<sub>2</sub> emissions in 2018 once again emphatically underscored the urgent need for action. But there are many other areas in which action is also required. Futureoriented approaches such as electric drives and autonomous systems are needed to cope with increasing traffic flows. And, in another significant development, more and more people are living longer and require adequate medical care.

All these topics have to be tackled with the use of innovative, sustainable materials. We see abundant scope for action here in the long term, and will make every effort to exploit the associated business opportunities.

Klaus Schäfer: And we'll do that in collaboration with partners, wherever possible. Together we have the best chance of achieving our vision of making the world a brighter place. That's why we're involved in numerous projects around the globe with companies from other branches of industry as well as our own in the field of science, in the context of social ventures and within our own Company. Covestro's efforts range from involvement in global projects such as the United Nations Environment Program to small-scale interventions. In 2018, for instance, we supported teams of students from India and China in a sustain-



Three characters, one team – the Board of Management of Covestro AG (from left): Dr. Thomas Toepfer (Finance), Dr. Markus Steilemann (Chairman), Dr. Klaus Schäfer (Production and Technology).

able building and living competition. Only if we all pull together can we bring about global change in the long term.

**Thomas Toepfer:** I'm delighted to be able to play my part as a new member of the Board of Management. And naturally I'm very pleased about the economic success we had last year, even if we had to adjust our guidance toward the end owing to fiercer competition and special items. All in all, we were able to increase our core volumes by 1.6 percent compared with 2017. As a result of the factors mentioned above, however, EBITDA remained slightly below last year's record levels, as did our return on capital employed (ROCE) and free operating cash flow (FOCF).

On the whole, 2018 came to a financially successful conclusion, which is also beneficial to our shareholders: Although

## **WE OFFER SOLU-TIONS FOR MAJOR CHALLENGES.«**

Dr. Markus Steilemann, Chief Executive Officer (CEO)

none of us was satisfied with the performance of the share price, shareholders can expect a dividend of 2.40 euro per share for 2018 – 20 cents more than last year.

Klaus Schäfer: But we don't just pay out money – we invest it, too. Above all, Covestro is expanding its production base considerably. We want to be optimally positioned in order to support the significant growth we expect in our markets. This is where global trends come into play, not least the issue → of feeding the expanding global population. One major problem is that many foodstuffs spoil before they reach consumers. Functioning refrigeration chains with outstanding insulation are crucial, and rigid polyurethane foam is making this possible: Forecasts suggest market growth much faster than the global economy at about five percent per annum. That's why we're investing in the expansion of our production plants for the rigid foam precursor MDI, including pumping 1.5 billion euro into our plant in Baytown, Texas alone. It's the biggest individual investment in Covestro's history.

Markus Steilemann: Increasing our level of investment is a cornerstone of our new strategy to create more growth, which we are implementing systematically. Another objective in this context is to gear Covestro's innovative capability even more toward sustainability. We plan to reduce our dependency on crude oil,

# **»WE'RE READY FOR THE DIGITAL AGE.**«

Dr. Klaus Schäfer, Chief Technology Officer (CTO)

for instance, using plants or even carbon dioxide in their place. And materials manufactured according to these principles helped us tap into another application area - the sports sector - in 2018: "Fit with  $CO_2!''$  is our new motto.

Klaus Schäfer: Another vital element of our strategy is the systematic digitalization of our company in the fields of research, customer relationships and in particular - production. Last year we launched a comprehensive program aimed at taking our global business operations into the digital age. We want to set new standards with a view to making facilities planning, operations and maintenance even safer and more efficient.

Thomas Toepfer: On the subject of efficiency, we aim to tailor all of Covestro's structures precisely to our requirements. Not just through the increasing use of digital solutions, but by stepping up cross-division partnerships, too. We expect this to result in annual cost savings of around 350 million euro by 2021 at the latest.

Markus Steilemann: But we're not just pursuing our own priorities, we're also addressing important social challenges. The problem of plastic waste in the environment is increasingly becoming the focus of attention, and rightly so, because it needs to be tackled swiftly and rigorously, both globally and at every level. Our industry has a crucial contribution to make in this respect, not least via a new global alliance of companies of which Covestro is a founding member. Plastics such as polycarbonates and polyurethanes are simply too valuable to throw away. What's more, the issue of waste must be incorporated into a comprehensive approach to circular economic activity. We will undoubtedly continue to face these major challenges for some time to come.

2019, which will be marked by heightened competition and global uncertainty in some areas, will be economically challenging as well. For the 2019 fiscal year we expect core volume growth in the low-to-mid-single-digit-percentage range. We anticipate the free operating cash flow between 300 million euro and 700 million euro. We expect ROCE between eight and 13 percent.

On the whole, however, we expect that our good growth prospects will continue. Covestro is fundamentally in a strong position. One of our really big pluses is our workforce of around 17,000 highly competent and committed employees, to whom we would like to extend our par-

# **»WE'RE MAKING COVESTRO EVEN MORE EFFICIENT.«**

Dr. Thomas Toepfer, Chief Financial Officer (CFO)



Many foodstuffs spoil on the way to the consumer. This is why well-functioning refrigeration chains are important – with outstanding insulation made, for instance, from rigid polyure-thane foam. Covestro is investing heavily in the production of the rigid foam component MDI.

ticular thanks for their great efforts last year. You're a strong team. And together with our many partners, we'll continue to push boundaries to make the world a brighter place.

Sincerely,

eman Man

Dr. Markus Steilemann

Dr. Klaus Schäfer





Key Data	
Covestro Group	

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Etta-Marie Mauer, Dr. Ioannis Papazoglou and Dr. Markus Lansing in the Technology Center at RWTH Aachen University. The university is one of the company's many close cooperation partners in the world of science. But we also rely on strong partnerships within and with the business world, working closely with start-ups and exchanging know-how across disciplines and sectors.

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## ECONOMY & SCIENCE

# LABORATORY ROM No

**TO MARKET** 

Recycling raw materials so that production is environmentally sounder – an idea that is gaining more and more attention in the chemical industry. Covestro is leading the way when it comes to substituting  $CO_2$  for crude oil. The company is working alongside business and scientific partners to develop new application options with support from the public sector. Making clothing from  $CO_2$  is one up-and-coming topic – and it is encouraging to note that ideas and successful research are increasingly resulting in real products that are popular on the market.

avan Manvi holds up a small tube made from white textile, strong and yet elastic. The resistance is so great that he needs both hands to stretch it. "This material has just the right elasticity for a compression stocking," he says, satisfied. As a researcher from the Institute of Textile Technology at RWTH Aachen University, Manvi knows that a perfect result is by no means a given. That's because he and his colleagues have adopted an innovative new manufacturing approach: The fibers of the prototype are made partly from a molecule present in the air all around us that is reputed to play a major role in global warming –



the greenhouse gas carbon dioxide, or  $CO_2$ .

Now  $CO_2$  has turned a researcher's dream into reality: It can replace a certain amount of crude oil, the scarce resource used predominantly as a raw material by the chemical and plastics industry to date. Both  $CO_2$  and crude oil contain carbon – a valuable element that is required for so many products, including textiles.

#### Synthetic fibers made from CO<sub>2</sub>

Manvi is making the most of this opportunity: He and his colleagues in Aachen, working alongside researchers from the Technical University of Berlin and Covestro, have succeeded in manufacturing market-ready synthetic fibers from  $CO_2$  and incorporating them in articles of clothing.

"We've demonstrated that we can produce high-performance fibers from thermoplastic polyurethane on a large scale in our melt spinning facility. This saves on fossil raw materials and reduces our CO<sub>2</sub> footprint compared with conventional synthetic fibers," says Manvi, who has been pursuing the research project at RWTH for the past three years. "We can also eliminate the →

Tangible success: scientist Pavan Manvi from RWTH Aachen University (right) and Covestro researcher Dr. Jochen Norwig holding a synthetic fiber prototype made from CO<sub>2</sub>. UN SUSTAINABLE DEVELOPMENT GOALS

CO 12 RESPONSIBLE CONSUMP TION AND PRODUCTION

Ensure sustainable consumption and production patterns solvents commonly used in the process and thus improve our environmental footprint even more."

#### Saving fossil resources

At the heart of this is a pioneering process developed by Covestro and its partners. For the first time, up to 20 percent of the crude oil commonly used in the manufacture of polyol, a precursor of polyurethanes, can be replaced with CO<sub>2</sub>. This is difficult, since carbon dioxide is extremely inert and a great deal of energy is required to produce chemical reactions with it. However, Covestro

#### WE CAN PRO-DUCE HIGH-PERFORMANCE FIBERS USING CO<sub>2</sub>.«

Pavan Manvi, Institute of Textile Technology, RWTH Aachen University helped develop a special catalyst that limits the amount of energy needed. "Thanks to this research breakthrough, we can now manufacture polyols based on  $CO_2$  on an industrial scale," says Dr. Christoph Gürtler, who heads the catalyst research team at Covestro.

The innovative precursor known as cardyon<sup>®</sup> was initially devised for use in the flexible polyurethane foam required to make mattresses and upholstered furniture – products with this innovative foam are already available on the market. However, cardyon<sup>®</sup> recently also made a name for

# FIT WITH CO<sub>2</sub>

#### Next step in the use of carbon dioxide

It's a world's first: synthetic sports flooring manufactured using  $CO_2$ . The world's first surface of this kind has been in use at a hockey club in Krefeld, Germany since 2018, now that Covestro has developed a new  $CO_2$ -based binder for it. Flexible foam manufactured from carbon dioxide has already been on the market for some time.



**1. PRODUCTION:** Covestro manufactures the first binder made from carbon dioxide in Dormagen near Cologne.



**2. DELIVERY:** The innovative precursor is supplied to the first customer, sports flooring producer Polytan.



**3. CONSTRUCTION:** Polytan lays an elastic underfloor made of rubber granulate and a CO<sub>2</sub>-based binder on a hockey pitch in Krefeld.



**4. WORLD'S FIRST:** The new, bright blue artificial pitch at the "Crefelder Hockey and Tennis Club" is a big attraction – it's great to play on and is particularly eco-friendly.

itself in the world of sports when it was sed for the new synthetic surface of a well-known hockey club in Krefeld (see "Fit with  $CO_2$ ").

#### Tested by textile manufacturers

Now the textile industry will become an application area for cardyon<sup>®</sup>. Its elastic fibers have already been tested by companies and used in the manufacture of yarns, socks, compression stockings and tapes. Textile manufacturers insist that the new material must be of the same quality in every respect and enable processing just as easily as conventional fibers. "We want to run tests to see how the new technology can be harnessed across various stages of the value chain," says the chemist Dr. Jochen Norwig, who is responsible for coordinating an EU-funded research project at Covestro that includes the development of the new CO<sub>2</sub> fibers.

And Covestro has its sights on even more application areas. "CO<sub>2</sub> is increasingly becoming an all-purpose raw material," says catalyst expert Gürtler, whose view coincides with that of other professionals from the worlds of science, politics and society at large (see "Moving away from oil"). "We're setting our sights on many other applications and sectors besides synthetic fibers and the textile industry. For instance, our researchers are working on the use of carbon dioxide in the production of car seats and in insulating materials for buildings and refrigerators."

#### **Cross-industry collaboration**

Gürtler and his colleagues are particularly fascinated by broad cross-industry approaches such as that of the pan-European research project "Carbon4PUR". Here, Covestro is heading a team of 14 partners from seven countries who are exploring how to extract the carbon from steel industry emissions, such as CO<sub>2</sub> and carbon monoxide, for use in chemical processes instead of the crude oil used to date. "Ultimately our aim is to incorporate CO<sub>2</sub> in many other types of plastic and to use it to replace as many fossil materials as we can," says Gürtler. The goal is to deploy carbon as intelligently as possible in order to close the carbon cycle. 



You will find more information on CO<sub>2</sub> on the website of the Technical University of Berlin.

### Raw Materials Summit 2018 MOVING AWAY FROM OIL



"We need alternatives" – the Raw Material Summit 2018 in Berlin, which Covestro helped organize, as seen by a cartoonist.

Strong partners, special skills and various perspectives are key to mastering difficult challenges. At least, that's the opinion of the Technical University of Berlin, the German Society for Chemical Engineering and Biotechnology (DECHEMA) and Covestro, who extended a joint invitation to the 2018 Raw Materials Summit on the university's premises. The event saw renowned representatives from the worlds of business and science, politics and society come together to shed light on a complex challenge: how can more energy and resources be saved in chemical production to aid the cause of climate protection? How worthwhile is the use of sustainable resources derived from plants and CO<sub>2</sub> in order to reduce our dependency on fossil fuels such as crude oil? How far can and should we go?

The speakers, among them by Dr. Erika Bellmann, Senior Policy Advisor at WWF Germany, had clear messages: "We triggered the climate crisis and are responsible for perpetuating it with our focus on coal, gas and oil. So we need to move away from fossil raw materials and towards new ones." The conditions for this are favorable: The European Union is supporting a number of projects in this regard, and the German government has also committed itself to change when it comes to raw materials.

"Innovative technologies already make it possible to produce the sustainable chemicals and fuels of the future," said Dr. Georg Schütte, State Secretary in the Federal Ministry of

#### **WE SUPPORT THE SEARCH FOR SUBSTITUTES FOR FOSSIL RAW MATERIALS.«**

Dr. Georg Schütte, State Secretary in the Federal Ministry of Education and Research, Germany

Education and Research, which sponsored the Raw Materials Summit. "We support the search for substitutes for fossil raw materials through targeted research funding in the field of bioeconomics and the use of CO<sub>2</sub>. This is also how we safeguard our international competitiveness."

The summit hopes for inspiration from young companies in particular. It sends a signal for a more entrepreneurial spirit with an international ideas competition that saw five start-ups from three continents selected as "Resource Innovators 2018". The first prize went to the Australian company Mineral Carbonation International, which produces building materials and other valuable industrial products from CO<sub>2</sub>.



You will find more information on  $CO_2$  in the video on the Raw Material Summit 2018

# ト C L L L

New inspiration for the chemical industry: Covestro is collaborating more intensively with the fast-growing start-up economy to encourage innovation. Young companies breathe new life into issues such as the digital transformation and the development of sustainable products, and in turn, the chemical industry can offer founders a wealth of exciting opportunities.

#### THE ACCELERATORS

New business opportunities in the fields of materials, innovation and digitalization can provide Covestro with a powerful boost. So it's no surprise that the company has been collaborating with the **Plug and Play** Innovation Center from Silicon Valley since 2018. One of the world's leading start-up accelerators, Plug and Play works to establish partnerships between founders and established companies, to the benefit of both: "Covestro gains new perspectives and the start-ups can profit from the company's global expertise and networks," says Saeed Amidi, CEO of Plug and Play.

#### THE NETWORKERS

Machine learning is a future trend and Ansatz is a start-up that specializes in this field, supplying digital tools for the development of new polymers. The special feature: Covestro accompanies the founder, **Dr. Newell Washburn,** a professor from Pittsburgh's renowned Carnegie Mellon University. Currie Crookston, Head of Innovation in North America for Covestro and himself a founder of five start-ups, is helping the young scientist get his business off the ground. Washburn is now finetuning his digital technology at Covestro in Pittsburgh – working as a start-up from within the company.

PLUGANDPLAY

#### **THE PIONEERS**

China has managed to create an attractive environment for start-ups within just a short time: By mid-2018 there were already over 270 Chinese "unicorns" – companies under ten years of age and with a value of over one billion US dollars. "We are tapping the innovative potential of the Chinese start-up scene for our own ends," says Dr. Michael Schmidt, Head of Innovation for the Asia-Pacific region for Covestro. An extensive study of the Chinese start-up landscape has been performed in a partnership with Kairos Consulting, and the next step is to implement the findings. In **Shenzhen, China's Silicon Valley,** for instance, Covestro has helped the first start-ups optimize their products with the aid of innovative materials.

# **DRIVER OF INNOVATION**

Of the 8,800 or so start-ups in Germany, just 250 have pursued business models in the fields of chemistry and biotechnology to date. However, the established industry is facing challenges that innovative young founders could very well help solve. Marie Westphal, "Chemistry Platform" Manager at the German Startup Association, and Dr. Hans Kespohl, Head of Business Model Innovation at Covestro, trade thoughts on this.



Dr. Hans Kespohl, responsible for innovative new business models at Covestro, sees great potential in the company's collaboration with young researchers and founders.

Westphal: As Germany's third-biggest industry, the chemical sector is naturally of great interest to founders – the materials it produces form the basis for technologies and modern life in general. It's also time for new ways of thinking in the traditional chemical industry: Society wants more sustainable products and "green" chemistry. Even though the number of start-ups being founded in the chemical sector is on the rise, there is still a lot of work to be done.

> Westphal: Yes! Sustainability is a key topic in chemistry and it plays an important role for startups, too. The German Startup Monitor 2018 found that over half the founders surveyed pursued sustainable business models with a view to making positive ecological and social contributions and staying competitive in the long term. But chemical start-ups also face obstacles, especially in sales, customer acquisition and capital procurement.

developed and new reusable material cycles created. The digital transformation is also changing working methods and business models – with new material solutions needed in fields such as autonomous driving. Start-ups can act as important drivers of innovation in this respect. But are founders even interested in the chemical industry's challenges?

Kespohl: I agree. Alternative raw materials and

sustainable production processes have to be

Kespohl: I can see that: New chemical processes and the development of alternative raw material solutions take time and cost money. That's where we, as a major company, can help. If we collaborate with young researchers and founders, we can respond to the demands of today much more quickly. We see great innovative potential in the fields of chemistry and applications technology at universities – not just in Germany, but the world over.

Kespohl: These new eco-systems formed by start-ups, universities, investors, service providers and institutions offer completely new opportunities for collaboration. We at Covestro are proud to be involved and to encourage new developments across borders.

Still concerned about obstacles for company founders: Marie Westphal, Chemistry Platform Manager at the German Startup Association.



Westphal: That's precisely why the Chemistry

Platform of the German Startup Association and

Covestro, are encouraging a founder-friendly environ-

the participating chemical companies, including

ment at universities, longer-term investments by global capital providers and networking between start-ups and established industry players.

SOUTH DEERFIELD

# THAT VITAL

Chlorine forms the basis for two-thirds of all polymers – which is why Covestro, like many companies, cannot do without it. But its manufacture consumes a great deal of energy. In Tarragona, a particularly energy-efficient new technology is now being used on a large scale for the first time as the result of a successful development cooperation.

#### UN SUSTAINABLE DEVELOPMENT GOALS

8 DECENT WORK AND ECONOMIC GROWTH

> Promote inclusive and sustainable economic growth, employment and humane work for all

igid polyurethane foam is particularly efficient when it comes to protecting buildings from heat and cold, and it keeps food fresh from the harvest all the way to the table when used as an insulating material in refrigerating equipment. Covestro manufactures the key building blocks for this product, including methylene diphenyl diisocyanate (MDI). Because the material is in such demand, the company is currently expanding its global production.

Tarragona in Spain is one of the expansion sites. We are also building a chlorine plant here, because chlorine plays a vital role in the production of MDI. However, its manufacture consumes a great deal of energy – and that means high costs. Help is at hand in the form of an innovative process developed to market maturity by Covestro and thyssenkrupp Uhde Chlorine Engineers: oxygen-depolarized cathode (ODC) technology, which is being deployed for the first time in an industrial-scale plant in Tarragona. This technology reduces the voltage required for the manufacturing process from three to two volts – one vital volt less.

BAYTOWN

"There were three key success factors in our development of ODC technology: trust, complementary skills and a common vision," says Denis Krude, CEO of thyssenkrupp Uhde Chlorine Engineers. "It took great perseverance and real groundwork to jointly develop a product from the germ of an idea all the way to series production. And we've taken a groundbreaking step towards greater sustainability."

"Germany's annual energy consumption would fall by around one percent if chlorine were manufactured across Germany using ODC technology. That would require a high level of investment," explains Dr. Hanno Brümmer, who is Head of Production at the Polyurethanes segment at Covestro and responsible for global chlorine production. "But the savings would be roughly equivalent to a year's electricity consumption in a big city like Cologne, Germany."



#### **BAYTOWN (USA)**

**Project:** Construction of a new large-scale plant for the rigid foam precursor MDI. At 1.5 billion euro, it marks the single biggest investment in the history of Covestro. The company hopes to benefit from significant growth in the MDI market. **Planned completion:** 2024



ROTTERDAM (NETHERLANDS) Project: Covestro and its joint venture partner LyondellBasell are incorporating an innovative technology into an existing production plant to convert water-based waste into energy and reduce the plant's CO<sub>2</sub> emissions considerably. Planned completion: 2020



#### ANTWERP (BELGIUM) Project: Aniline production is being expanded considerably as part of the global MDI investment program, strengthening Antwerp's position as the European center for aniline. The chemical is also required for the manufacture of the rigid foam pre-

cursor MDI. Planned completion: 2022



BRUNSBÜTTEL (GERMANY) Project: Construction of a new MDI plant. Ultimately production capacity will double to 400,000 metric tons per annum. That will make Brunsbüttel one of the largest MDI production sites in Europe.

Planned completion: 2019





#### SOUTH DEERFIELD (USA), MAP TA PHUT (THAILAND), GUANGZHOU (CHINA), DORMAGEN (GERMANY)

**Project:** Expansion of global film production to meet rising demand in all regions. These high-quality semi-finished goods are used in the automotive, medical equipment and security card sectors, among others.

Planned completion: 2019 / 2020



TARRAGONA (SPAIN) Project: Expansion of MDI production capacity and construction of the company's own chlorine production facility. This first industrialscale chlorine production plant is based on particularly energy-saving ODC technology.

Planned completion: Chlorine production: 2020 / MDI: 2022



LEVERKUSEN (GERMANY) Project: Construction of a new administrative building at the Leverkusen head office. This will provide new job opportunities for some 700 Covestro employees. Planned completion: 2019 / 2020



SHANGHAI (CHINA) Project: Covestro is responding to strong demand in Asia-Pacific with expanded polycarbonates production. The new capacities will be increased one step at a time and be available starting in early 2019. Planned completion: step-wise from 2019

# BUDY STATES OF A CONTRACT OF A

A MATCH MAD

Extremely lightweight and incredibly thin, with especially good molding properties and a metallic look and feel – Covestro is setting new standards on the composite materials market of the future with an innovative combination of fibers and plastics. The new material has had an encouraging response on the market with the support of a team including fabricators and distributors.



Elegant look: Household goods manufacturers are impressed by CFRTP's attractive appearance. here, can you hear that?" Yilan Li flicks her finger against the shiny black housing. It gives off a hollow ring – just the way you'd expect metal to sound. Except this isn't metal. The housing of the two adult-sized towers of a stateof- the-art air-conditioning system is, in fact, made of plastic. A plastic that sounds and feels like metal? And is even attractive – in this case, as elegant as brushed aluminum? One that is extremely lightweight and incredibly sturdy, offering unprecedented opportunities for designers?

"We're talking about CFRTP, a brand-new composite material," explains Yilan Li, a market developer, who is employed at the company's Asian research center in Shanghai. CFRTP stands for continuous fiberreinforced thermoplastic composite. Li

#### »COVESTRO AND HAIER HAVE ACHIEVED A MAJOR BREAKTHROUGH WITH THE NEW COMPOSITES.«

Shao Qingru; Designer, Haier Group

played a crucial role in ensuring that this new material was selected for use in the elegant air-conditioning unit made by China's Haier Group, the world's biggest "white goods" manufacturer (since air-conditioning units are traditionally white).

CFRTP is the product of a match made in heaven. One half of that match is carbon or glass fibers, which provide strength and lightness. The other half – plastics such as polycarbonate or thermoplastic polyurethane – makes the material flexible, durable and, above all, easy to mold.

#### A wide array of applications

A combination of good properties like this one is extremely attractive on the market to the many companies and branches of industry that need high-quality materials. What's more, specific features can be incorporated in the new composites known as Maezio<sup>™</sup>, which are particularly quick and efficient to produce. They can also be recycled. All this provides Li and her colleagues with a wealth of opportunities when it comes to identifying additional application areas for this up-and-coming material.



Slim and fit: New composite material from Covestro consists of thin black tapes (left). The sheets, which are created by layering the tapes, are especially firm and lightweight. Fibers and the high-performance plastic polycarbonate (right) are used to manufacture the tapes.

"Sorry if it's a bit messy in here," says the 39-year-old, gesturing around the loft in which she works. It has the feel of a garage company: One corner is occupied by an electric scooter, while bicycle parts hang from the ceiling. One of the tables is cluttered with laptop lids that vary widely in terms of color and surface structure – although all are particularly thin and lightweight. "These are around 15 percent lighter than ones made from conventional magnesium-aluminum alloys," says Li.

This is good news for the electronics industry, which is especially eager to produce streamlined, lightweight notebooks, tablets and smartphones. But other industries are very interested in the new composite  $\rightarrow$ 

#### Incredibly stable:

The material is valued by shoe manufacturers because it provides the foot with especially good support.





#### Light as a feather: The automotive industry wants to minimize weight – the new composite material makes that possible.



material too, including manufacturers of sportswear such as the Chinese start-up Bmai (see "Marathon with Maezio™"). Further applications can be found in the automotive, furniture, baggage and medical equipment sectors, among others.

#### Filling a gap in the market

"Lots of branches of industry are looking for extremely robust and lightweight materials that will enable them to manufacture parts that are even thinner and can be integrated into the functions. They also want more efficient production. Our new high-tech material fills this gap," says Lisa Ketelsen, who heads the Covestro CFRTP business in Shanghai.

But the idea first took hold in rural southern Germany, a good 14-hour flight away, where a couple of engineers launched a thermoplastic composites start-up over a decade ago. In 2015, that start-up was acquired by Covestro and developed further. Commercial production started three years later. Since then, the sleepy town of Markt Bibart has been supplying CFRTP films and sheets to companies around the globe (see "Composite Valley in the countryside").

# High-tech production COMPOSITE VALLEY IN THE COUNTRYSIDE

Markt Bibart is an idyllic little town in Franconia (a region in the northern part of Bavaria, Germany) where tradition is important and the beauty of the surrounding countryside is a key advertising feature. It's hard to imagine high-tech goods being manufactured in such a picture-book setting, but that's just what is happening in an inconspicuous gray building on the edge of town where Covestro began the large-scale manufacture



High-tech made in Franconia: CFRTP production in Markt Bibart.

of its leading-edge material CFRTP in March 2018. The company has invested a mid-double-digit euro sum in the plant.

But why manufacture the new material here in the countryside, far from the company's major locations in the Rhineland and on the North Sea? The region's role as something of a Composite Valley was one key to the decision: It is home to renowned universities and institutions that are close cooperation partners of Covestro because they conduct intensive research into the development of composite materials – the University of Bayreuth, the Friedrich Alexander University Erlangen-Nuremberg and Neue Materialien Fürth GmbH, a research facility sponsored by the Bavarian government.

The latter is the workplace of Senior Engineer André Lück, an expert in composites development: "We are seeing increasing global demand for materials that are both sturdy and lightweight and can be manufactured in large quantities. Composites made of fiber-reinforced thermoplastic materials meet all these requirements." Haier was particularly impressed by the wide-ranging design flexibility and innovative appearance of the composite. "The first time I laid eyes on the material, I was struck by its aesthetic quality. Naturally we were interested right away," says Shao Qingru, a member of the company's design team.

Even so, there were several major obstacles to overcome along the long road to the goal of incorporating the material in Haier's luxury air-conditioning unit. To start with, Yilan Li and her colleagues at Covestro had to set up an entire value chain, since the fabricators had no experience using the new precursor. "We ran from one provider to the next," recalls Li. Eventually the right partner for the project was found – Suzhou Yichangtai Plastic, whose Managing Director, Chen Jinming, says: "The age of fiberreinforced thermoplastic materials is dawning. Investing in this technology will give businesses a competitive edge."

#### New materials are not easy to find

Haier's Shao Qingru is also optimistic. "It isn't easy to find new materials, and it takes a lot of effort and expenditure to get them to the point where they can be used successfully in an end product," says the designer. "In my eyes, Covestro and Haier have achieved a major breakthrough."

It's clear that fibers and plastics aren't the only match made in heaven. Material developers, suppliers and distributors also make a formidable team.





This story and more information on composite materials can also be found online.



Professional designer: Axis Liu from Chinese sportswear manufacturer Bmai.

Interview

## MARATHON WITH MAEZIO™

Meet a Chinese best-seller: Bmai's marathon running shoe 42 K Lite. The sportswear manufacturer Bmai, which was founded in 2015, focuses on selling affordable products directly online. Another focal point is the use of high-performance materials, which is why a new composite from Covestro has now been used in a limited edition of its popular shoe. Axis Liu, Head Designer at Bmai, explains.

#### Shoe manufacturers are constantly on the look-out for new technologies and materials. Why is this?

In our industry, you have to pay great attention to staying ahead when it comes to brand positioning, and that applies to the technology in your products, too. New materials are one of the main drivers of innovation in the footwear industry. There is a huge range of materials to choose from, but shoemakers are especially interested in lightweight materials that provide the foot with better support and stability and help boost performance.

# What convinced you to use a completely new material such as Maezio<sup>™</sup> from Covestro for the shaft of your current model?

There are several reasons why we are attracted by these composites. Their unidirectional texture is particularly interesting. It makes a change from the weave pattern of conventional fiber-based materials and gives the shoe a fresh appearance. Best of all, the new composites are extremely sustainable – they can be recycled.



You will find more information on <u>CFRTP composites on our website.</u> From computer animation to reality: Indian students worked quickly to construct a solar building that produces more energy than it uses.

# VISIONS FORLIVIC

More and more people are moving to the cities, increasing the need for innovative solutions in the field of sustainable building and living. International contests such as the Solar Decathlon give students the opportunity to showcase their ideas for making the mega-cities of today and tomorrow eco-friendly and worth living in. They have all the required materials and tools to hand – as well as the support of Covestro.

#### UN SUSTAINABLE DEVELOPMENT GOALS

11 SUSTAINABLE CITIES

Make cities inclusive, safe, resilient and sustainable t won't be easy, but we can still do it! Vijay Sharma is excited. The Indian student is spending this humid summer night on a brightly lit construction site in Dezhou in northeastern China, where trucks laden with materials are slowly arriving. It's a big relief for Vijay and his team members: They can finally begin to build the sustainable house they have designed from scratch in recent months. They have just 12 days – instead of the original 23 – to complete their task, because the construction materials have taken so long to arrive. Time is extremely tight, but giving up is not an option. On Vijay's signal, his fellow students from the Indian Institute of Technology (IIT) get to work.

The Solar Decathlon 2018 – the "Olympics" of sustainable building and living – is responsible for their presence here in temperatures of over 40 degrees centigrade. This contest invites teams from all over the globe to submit unusual ideas for the design and construction of houses that are sustainable in every respect and draw their energy from solar power alone. The results are scrutinized closely at the judging stage of the contest, which has the purpose of finding solutions for the pressing challenges of increasing urbanization and population growth. These challenges affect countries such as India and China in particular.

#### Initiatives for sustainable urban development

Here, as in most of the world's countries, the exodus from rural into urban areas is continuing steadily. According to the United Nations, over two-thirds of the global population will be living in cities by the year 2050. The sustainable design and development of urban areas and living conditions is therefore an absolute priority. The Indian government, for instance, has launched various initiatives to encourage investments in residential, infrastructure and energy projects. Its umbrella program "100 Smart Cities" aims to make cities more people-oriented and sustainable. And one of the objectives of the five-year plan in China is to ensure that by 2020, the energy efficiency of new buildings increases by one-fifth from their 2015 levels.

Sustainable urban development affects all areas of society. "Innovation in this field is possible if skills and knowledge join forces with imagination and strategic thinking and the necessary technical resources are available," says architect Ashok Lall, who lectures at the Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies in Mumbai, India. "We must bear environmental protection and climate change in mind in our search for solutions. Sustainable materials and production processes are important, but living must be affordable and remain so, particularly for the poorer classes."

The Solar Decathlon has been supporting such ideas ever since its inception in the USA in 2002. The contest has become an annual forum for advanced concepts in the field of sustainable living and is now also held in Europe, the Middle East and China, among other regions.

But back to Dezhou, the center of the Chinese solar industry – and consequently known as China's "Sun City". Vijay and his team complete their work on the construction site as day dawns. They have managed to unload three trucks of materials overnight and construct the skeleton of their house in just one hour. Now they have 11 days left in which to complete the job. Vijay takes a break for a quick chat around lunchtime. "Everything that has to be done here is being done by us. We're now familiar with at least 20 ways of building a sustainable house," says the visibly proud 28-year-old student. "It was an exciting challenge to design a house for immediate construction that satisfies future requirements. We had to think out of the box, yet also consider the challenges of urban life in

#### **»BUILDINGS MUST BE SUSTAINABLE AND AFFORDABLE.«**

Ashok Lall, Design & Technology Chairman, Kamla Raheja Vidyanidhi Institute for Architecture, Mumbai

our region. The experience and support of partners such as Covestro has been invaluable."

#### Covestro lends its support to two teams

Besides supporting the "Shunya" team, Covestro also helped a rival Chinese team compete in the Solar Decathlon. "Sustainable innovation is at the heart of all our activities, and we are always eager to cooperate closely with local partners," says Isaac Emmanuel, Head of Industrial Marketing and Advocacy at Covestro in India. "We were delighted to be able to support the IIT students with money, know-how and our materials."

Covestro products used in the "Shunya" house include insulating panels in the walls, floor and roof, and the steel frame coatings. The result is a 150-squaremeter solar building that produces more energy than it uses and enables a family of six to live sustainably and in comfort.

Vijay and his team eventually managed to complete their house in 12 days, despite all the difficulties. Even if they don't win the contest, they have pushed boundaries and shown what can be done – and that's just the right attitude for sustainable urban development.



You will find more information on the competition on the Solar Decathlon website



Participating in the Solar Decathlon: Vijay Sharma from the Mumbai-based "Shunya" team.



Architect Ashok Lall teaches Indian students how to build sustainable and affordable houses.

Downtown Pittsburgh: The past and the present meet here in an especially striking fashion. Covestro wants to support and help shape the city's transformation into a high-tech metropolis. Here as elsewhere, the company participates in a wide range of social projects. Commitment, inspiration and collaboration also shape our internal world through future-oriented surroundings and extensive digital processes.

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TOGETHE

#### SOCIETY & EMPLOYEES

# REINVENTS

In Pittsburgh, steel manufacturing has given way to robotics and the development of driverless cars, as the city transforms itself from a former steel stronghold into a future-oriented metropolis. Covestro has called Pittsburgh home from the 1950s, and is today helping the city, recently ranked the No.2 most livable city in America, work towards the United Nations Sustainable Development Goals.

Pittsburgh, Pennsylvania has around 300,000 inhabitants in a picturesque location where three rivers come together. Its nickname is Steel City. It has long been much more than a former major industrial center, however: Pittsburgh is reinventing itself. The city has bundled the challenges faced by modern metropolises and is developing solutions that can serve as blueprints for use elsewhere.

These challenges include the city's industrial heritage: Pittsburgh was the center of the steel manufacturing industry as early as 1875, and just 40 years later was responsible for over half the steel output in the US. The economy was booming, but this industry-driven success came with environmental burdens on air quality and the waterways.

#### A new beginning

The collapse of the steel industry in the 1980s hit Pittsburgh hard. The transformation didn't come overnight, but eventually the city recovered. "What's going on here is not an accident or a fluke. Pittsburgh has been so lucky over the years to be loved by people who were in a position to take us where no one thought we could go," says Mayor William Peduto. "These visionary leaders offered a long-term plan of how a city – a city that had its economic heart ripped out, a city that everyone had said had lived its time and died – could come back."

Today Pittsburgh is a technology center with 29 institutions of higher education. Subsidiaries of technology giants such as Google, Microsoft, Apple, Facebook, Amazon and Uber have opened in their immedi-

ate vicinity. These companies, which are proving to be attractive employers for young graduates in particular, are also making their mark on the city.

For instance, Pittsburgh has become a center for autonomous driving. Uber is testing its self-driving cars at a new test site on the Monongahela River, where a steel mill once stood. And soon another section of the former industrial district will open, featuring parks, housing and business premises by the river. The first tenant will be the Manufacturing Futures Initiative of Carnegie Mellon University, a leader in the digital transformation of the manufacturing industry. Next door will be the Advanced Robotics for Manufacturing Institute, which enables and sponsors projects in the field of robotic technologies.

Pittsburgh hopes that these renowned institutes will attract other ambitious companies and start-ups. The revival of the industrial district is symbolic of the transformation from the "Steel City" it once was, to a hightech metropolis and pioneer in the fields of automation, artificial intelligence, robotics and autonomous driving. And Covestro intends to help shape and support this transformation – not just with its high-performance, sustainable materials for use in any number of future-oriented applications, but with a sustainability summit, too. After all, the company's US business has been managed from Pittsburgh for decades, and Covestro is deeply rooted in the city.

#### Summit for a sustainable future

In 2018, Covestro staged the THINC<sup>30</sup> summit in Pittsburgh for the second time. "We see ourselves UN SUSTAINABLE DEVELOPMENT GOALS

#### $\sqrt{\mathbf{4}} \, \mathbf{3} \,$ good health and well-being

Ensure healthy lives and promote well-being for all at all ages New beginning: Mayor William Peduto is pleased that Pittsburgh is making a comeback after the end of the industrial era. Numerous world-renowned high-tech companies have meanwhile opened offices here.





The intermediary: Covestro is bringing together a variety of players to promote collaboration and an innovative spirit in Pittsburgh, says Rebecca Lucore, who is responsible at Covestro for sustainability and social responsibility in the US.

#### »COVESTRO PROMOTES TEAMWORK AND INNOVATIVE THINKING IN PITTSBURGH.«

William Peduto, Mayor of Pittsburgh

as mediators between business and the non-profit sector," says Jerry MacCleary, who heads the Covestro business in the US. "THINC<sup>30</sup> is our way of bringing the United Nations Sustainable Development Goals to the citizens of Pittsburgh, who have really taken them to heart." (see "Sustainable action for a better future".)

THINC<sup>30</sup> stands for transforming, harnessing, innovating, navigating and collaborating with a view to making the city more sustainable and inclusive by 2030. The event is attended by representatives from the business, academia, non-profit and philanthropic communities – all of whom are united by their interest in Pittsburgh. "By bringing together thought leaders and organizations, we are encouraging transformative partnerships that ultimately contribute to the sustainable future of Pittsburgh and the region as a whole," says Rebecca Lucore, Head of Sustainability and Corporate Social Responsibility at Covestro in the US.

In 2018, more than 500 people registered to learn how they, as businesses, organizations and individuals, can address the biggest sustainability challenges facing Pittsburgh today, tackling topics including poverty, hunger, equity, education and climate change. Attendees heard from international, national and local sustainability experts who showed them how they, too, can become change agents in their community. They listened to people such as Leah Lizarondo, whose mission is to get food to hungry people, while reducing the food waste that produces greenhouse gases.

#### SOLUTIONS **CHALLENGES NEEDS** 1 Energy efficiency through e.g. weight Lightweight, stable plastics reduction, electro mobility instead of glass and metal 2 Greater comfort New LED concepts for more 3 Outstanding design economical and better lighting and INCREASING MOBILITY improved safety • New materials for wind turbines: More efficient manufacturing, greater yield, 1 Renewable energies reduced maintenance time 2 Energy-efficient buildings CLIMATE CHANGE Materials that insulate against heat and cold Lightweight construction Insulating materials for cooling systems POPULATION GROWTH 1 Affordable housing, infrastructure Materials for greenhouses, drying 2 Energy-efficient household appliances systems for preserving food 3 Fight against poverty and hunger

#### Sustainable action for a better future



The battle against hunger: Leah Lizarondo is committed to better nutrition, especially for poorer people in the Pittsburgh region. At the same time, she wants less food to end up in landfills.

Lizarondo recruited support for her mission at the THINC<sup>30</sup> summit hosted by Covestro. The event also featured discussions on other urgent topics such as equal opportunity, education and climate change.

#### THINC<sup>30</sup>

### The Pittsburgh summit in NUMBERS

THINC<sup>30</sup> – 2018 marked the second year in succession that Covestro brought together a diverse group of stakeholders to develop common ideas for a sustainable future for the Pittsburgh region by 2030.



And they heard from social justice attorney Tiffany Sizemore, who is working to disrupt the school-to-prison pipeline that devastates the lives of so many young people of color by unfairly setting them on a path of a lifetime of incarceration for minor infractions, like being late for school.

"Covestro is bringing together a wide variety of players to inspire the collaboration and innovative thinking needed to move Pittsburgh forward for the benefit of all," resumed Lucore. In other words, what looked like the end of an era was actually a new beginning – and the start of a better future.



You will find more information on our website.

At the heart of the UN's Agenda for Sustainable Development are the 17 UN Sustainable Development Goals (SDGs), an extensive concept for peace and prosperity for all people and the protection of the entire planet. With this agenda, the UN member states have committed themselves, among other things, to end poverty, improve health and education, and fight climate change. It's a peerless example of global partnerships. Covestro is also committed to these goals. The corporate strategy's cornerstones are oriented toward the SDGs, and the company's sustainable research and business dealings make a contribution to fulfilling them – always with a view to making the world a brighter place.

Covestro Annual Report 2018

### **OEARLY** EVER TO Plastics are far too valuable to be discarded. Covestro is committed to a sustainable use of resources - in its own company, side by side with global partners and in

local programs, too.

Little conservationists: The company's picture book is helping children in Taiwan and Thailand learn how to handle waste correctly

UN SUSTAINABLE DEVELOPMENT GOALS

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Ζ

Protect and sustainably use the oceans, seas and marine resources

'hat's that frightening object poking out of the water? The occupants of the dinghy, Charlie, Victor and Kathy, quickly figure out that it can't possibly be a shark. No, it's a pile of debris floating in the water. But the three friends know just what to do: Victor makes a big net out of algae which the other two use to wrap around the pile before dragging it ashore with the help of a couple of fish. The flotsam is then disposed of correctly.

These three little conservationists are the heroes of a picture book published by Covestro and distributed at primary schools and kindergartens in Taiwan. Since the book was launched in 2017, it has reached an audience of over 20,000 young readers. With its light-hearted approach, it aims at encouraging children to develop a responsible attitude to waste and opening their eyes to a problem affecting not just the island of Taiwan, but the world at large: plastic waste in the oceans. An average of eight million metric tons of plastic finds its way into the sea every year.

Efforts to address the situation are being made everywhere by governments, authorities and organizations, companies and associations, researchers and consumers alike - for example, in finding ways to collect waste. A particular concern is to prevent more and more waste ending up in the oceans via waterways or uncontrolled landfills. Taiwan's two-pronged approach focuses on prevention and education. The company's picture book has received the support of five natural science museums and, as of 2018, nine national parks as well.

"Mankind is currently searching for water in space while neglecting our rivers, lakes and oceans," says Wei-Hsin Sun, Director General of the National Museum of Natural Science. "We have to persuade the public, and the younger generation in particular, to take water pollution seriously and to tackle the problem."

One thing above all should be clear: Plastics are generally far too valuable to simply throw away. In many durable - in example non-disposable - applications, they make life safer, more comfortable and especially

#### **»WE HAVE TO MOBILIZE THE PUBLIC MORE EFFECTIVELY.«**

Wei-Hsin Sun, Director General of Taiwan's National Museum of Natural Science

more sustainable, by ensuring that vehicles use less fuel and buildings less energy, to name just two examples.

Yet even when consumers are finished with them, plastics can be useful: Ideally, they are recycled and, in the process, mechanically or chemically separated so that new plastics can be made from them.

"If effective waste management and recycling become more common worldwide and the throwaway mentality in society changes, we'll have the chance to stop littering the ocean with plastics and other materials," says Dr. Christian Haessler, Head of Sustainability at Covestro.

#### Global alliance against plastic waste

Haessler has great hopes of the new Alliance to End Plastic Waste – a worldwide coalition of around 30 companies working in the chemicals, plastics, consumer goods and waste industries. Covestro is a founding member of the alliance, which intends to provide more than a billion dollars over the next five years to improve waste management and pursue waste reduction. At the same time, the alliance wants to drive forward solutions for the sensible use of plastics after they have served their original purpose.

"What's decisive is a holistic concept – within the plastics industry and far beyond it," says Haessler. "We will only succeed in using resources sustainably if we consider every part of the raw materials cycle, from procurement and use all the way to recycling."

Covestro is supporting this comprehensive approach within the company, too. When it comes to raw materials, for instance, we are working with partners to research how to recycle emissions such as CO<sub>2</sub> from the steel industry and thus save on crude oil. In production, for instance, we are working on a new process aimed at recovering salt and water as raw materials. And in the products area, Covestro is using polycarbonate water bottles to manufacture composite materials.

"We also see other companies along the value chain make similar efforts and this is a trend that needs to pick up speed," says Haessler. "At the same time, we have to push for a public change in awareness." In this spirit, Covestro is cooperating with the WWF in Hong Kong, for instance, to encourage schoolchildren to reuse plastics and to educate them about marine pollution through a program of excursions. And the Covestro picture book featuring the three little environmentalists is also popular in Thailand, where it was developed. Its hero, Charlie, has a clear message: "We can get rid of this mountain of waste for good if we learn how to produce less litter, re-use it and recycle it."





New recycling: Miranda Wang turns plastic waste into chemical precursors.

# Young Champions Bright ideas

Some types of plastic waste cannot be recycled. At least, this was the case until recently, when Miranda Wang and her friend had the bright idea of breaking this waste down into its chemical components, thus creating new materials that are even biodegradable. The two Canadians developed a special low-cost catalyst for this purpose. Their small California- based company Bio-Cellection is pursuing a big goal: to make the world's plastics endlessly recyclable one day.

And their project now has additional backing from the United Nations, which has nominated Miranda Wang as one of its Young Champions of the Earth of 2018. The 24-year-old shares this honor with six other inventors from around the globe who are working on environmental projects ranging from the use of diesel particulate matter all the way to the protection of coral reefs. As a partner of the United Nations Environment Program (UNEP), Covestro offers the young pioneers expert advice and networking support.



You will find more impressions of the Young Champions of the Earth on the UNEP website.



# THE C<sup>3</sup> WORLD

Your working life is influenced by your working environment, so people who want to be creative and successful are best off working in an inspirational setting. Next to the corporate culture, office premises are key when it comes to creating optimum working conditions. With its corporate values and new working environments, Covestro is encouraging communication, solidarity and productivity around the globe.

he Work Café provides a good setting for a meeting. Those who want to work in peace take their seats at one of the screened-off tables, while small and larger rooms are available for confidential discussions. This varied and flexible new way of working is now being rolled out globally at Covestro, but it has been practised on the 43rd floor of One Island East Tower in Hong Kong since 2018 and offers just the right surroundings for nearly every task.

#### Modern, open and communicative – the new working environments at Covestro

Individual desks and conventional outer offices are passé – activity-based work in flexible environments is the new plan. The aim is to improve employee communication and collaboration across departments in order to achieve better results. The concept has already been implemented in Thailand, Taiwan, Switzerland, Italy, Mexico and Brazil as well as in Hong Kong. Two sites in China are next in line. And a new administrative

#### »INNOVATION AND COLLABORATION ARE BECOMING MORE AND MORE IMPORTANT IN OUR WORK LIVES.«

Stephan Rosenthal, Head of Country Platform Management, Covestro



building featuring modern architecture and an inspirational interior is being constructed for 700 employees at the company's head office in Leverkusen.

#### New employee campaign encourages a sense of togetherness

"Employees increasingly want flexibility and a casual atmosphere. At the same time, innovation and collaboration are key to the C<sup>3</sup> working environment," says Stephan Rosenthal, Head of Country Platform Management at Covestro. "The C<sup>3</sup> working method supports our employees in doing this." The name C<sup>3</sup> is a reference to the company's three key values: curious, courageous, colorful. The focus is on togetherness, as expressed in the new employee campaign "We are 1". As Rosenthal puts it: "I' is becoming 'We'".

An artist's impression of the new administrative building at Leverkusen.

# **BINARY IS BETTER**

Digitalization is transforming dayto-day operations in the chemical industry and making cross-border collaboration easier and faster. Two researchers and an engineer report on the benefits.

ose Gamez is a chemist at Covestro in Leverkusen, Germany. He used to do most of his work in a laboratory among glass flasks and centrifuges, but for the past 12 years he has spent his time primarily at his computer – as a laboratory chemist who has become a computer chemist. When he inputs data from his experiments, the computer converts it all into the 0s and 1s of binary code before the calculations can begin. And the results are quite astonishing. According to Gamez, computer-based chemistry opens up a whole new world of opportunity: "A high-performance computer can run through experiments much more quickly than we can in the laboratory." This enables many more experiments to take place – even entire series of tests that would previously have been far too complex.

#### Computer chemistry creates new opportunities

The computer can also provide useful insights: "In the laboratory, we only see the results of a reaction. But the computer can also show us why things work. That's a real gain for us," explains Matthias Leven, a digital catalytic process expert at Covestro. If an experiment works on the computer, it is verified in the laboratory.

Leven is collaborating with colleagues from Pittsburgh, Pennsylvania (USA) and Amagasaki, Japan



Faster and better results: Matthias Leven uses high-performance computing for digital catalysis research at Covestro.

on the development of catalysts and the modeling of new chemical approaches. This global teamwork will become even more intensive when a new data platform is in place.

#### **Cross-border collaboration**

The exchange of information across national borders is also helping Hao Wu, a technical expert in the digital pilot project "Covestro Global Asset Monitoring" in Shanghai. He and his fellow engineers in Germany and the USA regularly discuss how data analysis can be enhanced with the help of software. Together, they are developing a program designed to eliminate the laborious process of collecting data from various instruments and equipment at the company's plants: "Digitalization is making us much more efficient as well as smarter," says Wu. Having worked as an engineer for over ten years, he is convinced that there is no time better than the present.

# Artificial intelligence VIRTUAL WAYS OF WORKING

Three questions for Dr. Gerlind Wisskirchen

# What changes can employees expect artificial intelligence (AI) to bring?

In future, Al will play a role in decision-making in every part of a company. New business models will also be established: Automated activities will be developed together with third-party companies and freelancers will be hired via platforms for special tasks. That's something else that employees will have to get used to.

#### Which parts of a company will be affected by the new Al-assisted collaboration?

All the divisions and departments will ultimately operate on the basis of Al: There will be platforms for the purchase and sale of goods and for payment transactions, communication



Dattorms for advertising, and crowdworking platforms that can be used to commission a wide range of services for the company.

What challenges do platform economics pose for employees and, in particular, managers? The use of virtual teams in the company will increase, and they will frequently be made up of

Dr. Gerlind Wisskirchen, lawyer specialized in labor law and partner at CMS Hasche Sigle, a German commercial law firm.

employees from various facilities plus different external service providers. The challenge will be to coordinate both the digital teams and the freelancers, because they may all be working from different places and at different times. This will demand a lot of project managers and management when it comes to communication and coordination.